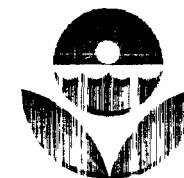


SDMS Doc ID 2015050



2015050

PERCHLORATE



**U.S. EPA, Region 9
Prepared by Kevin Mayer**

Perchlorate - Chemistry & Uses

**History of Environmental Concern
Occurrence**

Toxicity

Regulatory Status

Treatment Technologies

Perchlorate CHEMISTRY



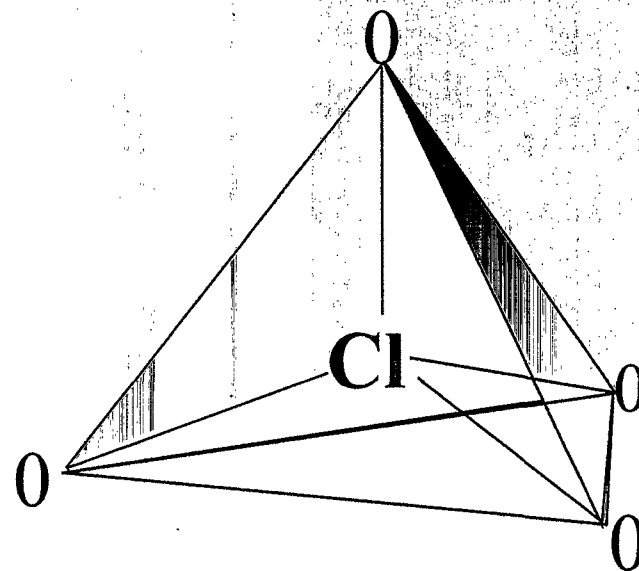
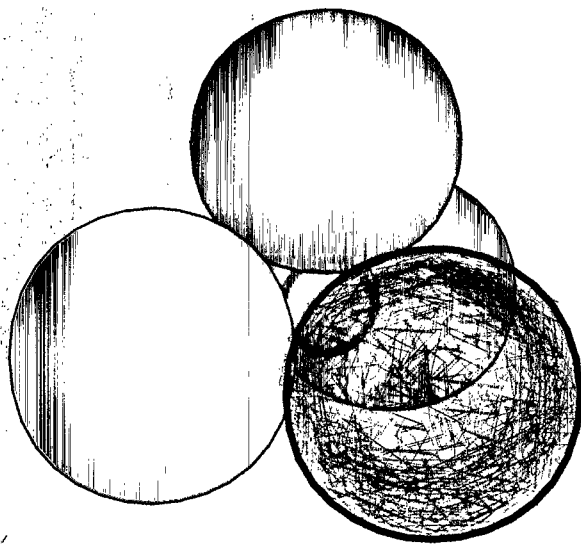
Dissolves and Moves Like Salt in Water

Highly Soluble, Mobile, Stable

Hard to Treat by Usual Methods

**Hard to Detect Below 400 ppb,
until March 1997**

PERCHLORATE



Perchlorate USES

**90% Manufactured for Solid Rocket Fuel
Explosives**

Fireworks, Flares and Smoke Markers

Reported in Nitrate Fertilizer from Chile





Perchlorate HISTORY

**1920s - First Manufactured at Niagara
Falls, Eventually at 7 Locations**

**1980s - Aware of Perchlorate Use at
CA and NV Superfund Sites**

**1990s - Aerojet in Rancho Cordova
Discovered at > 1000 ppb in Groundwater**



Perchlorate HISTORY

**1992 and 1995 - EPA Provisional Reference Dose
at 4 - 18 ppb**

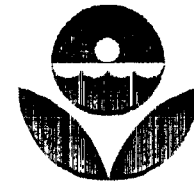
1997 - Analytical Breakthrough to 4 ppb

**1997 - Region 9 Requests Manufacturer's
Information**

**1997 and 1998 - Region 9 Alerts EPA
HQ, Regions, and States**



Perchlorate SHIPMENTS



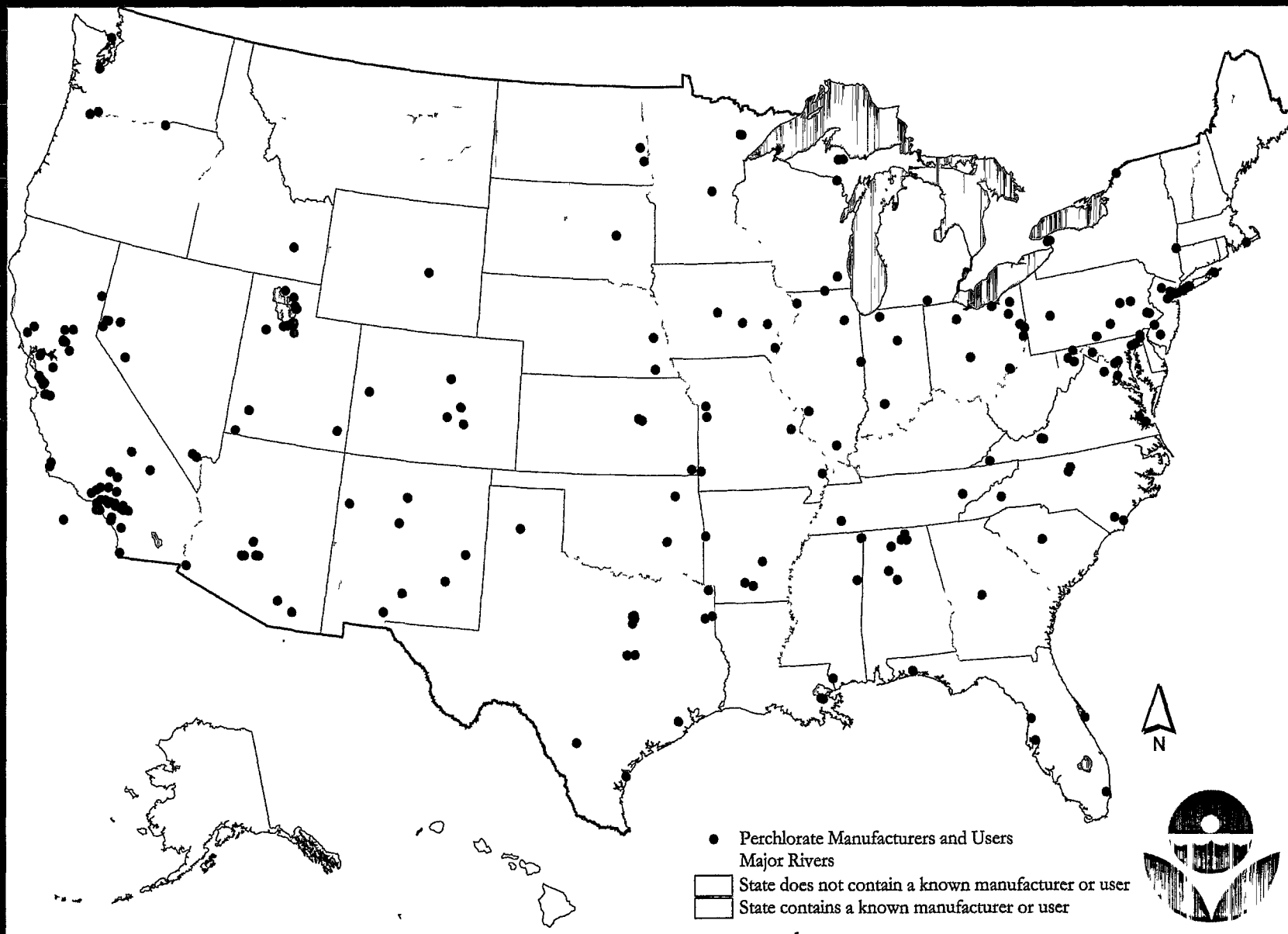
**Manufacturer's Information
from Region 9 Requests**

About 240 Facilities

40+ States

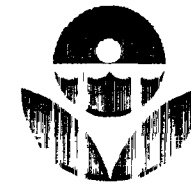
Information Not Available Before 1970s

PERCHLORATE MANUFACTURERS and USERS



APRIL, 2003

Perchlorate OCCURRENCE



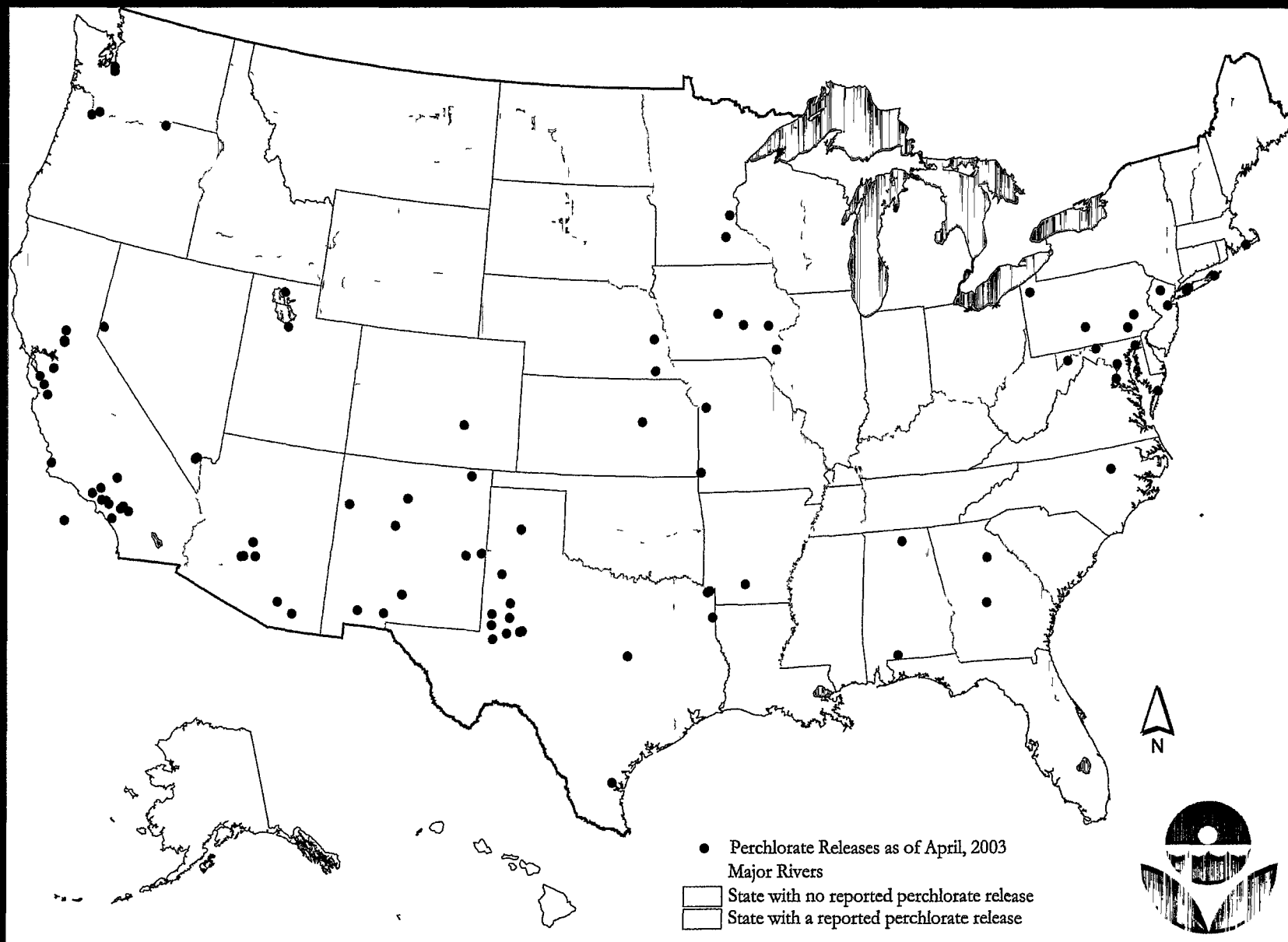
Releases Reported in 29 States

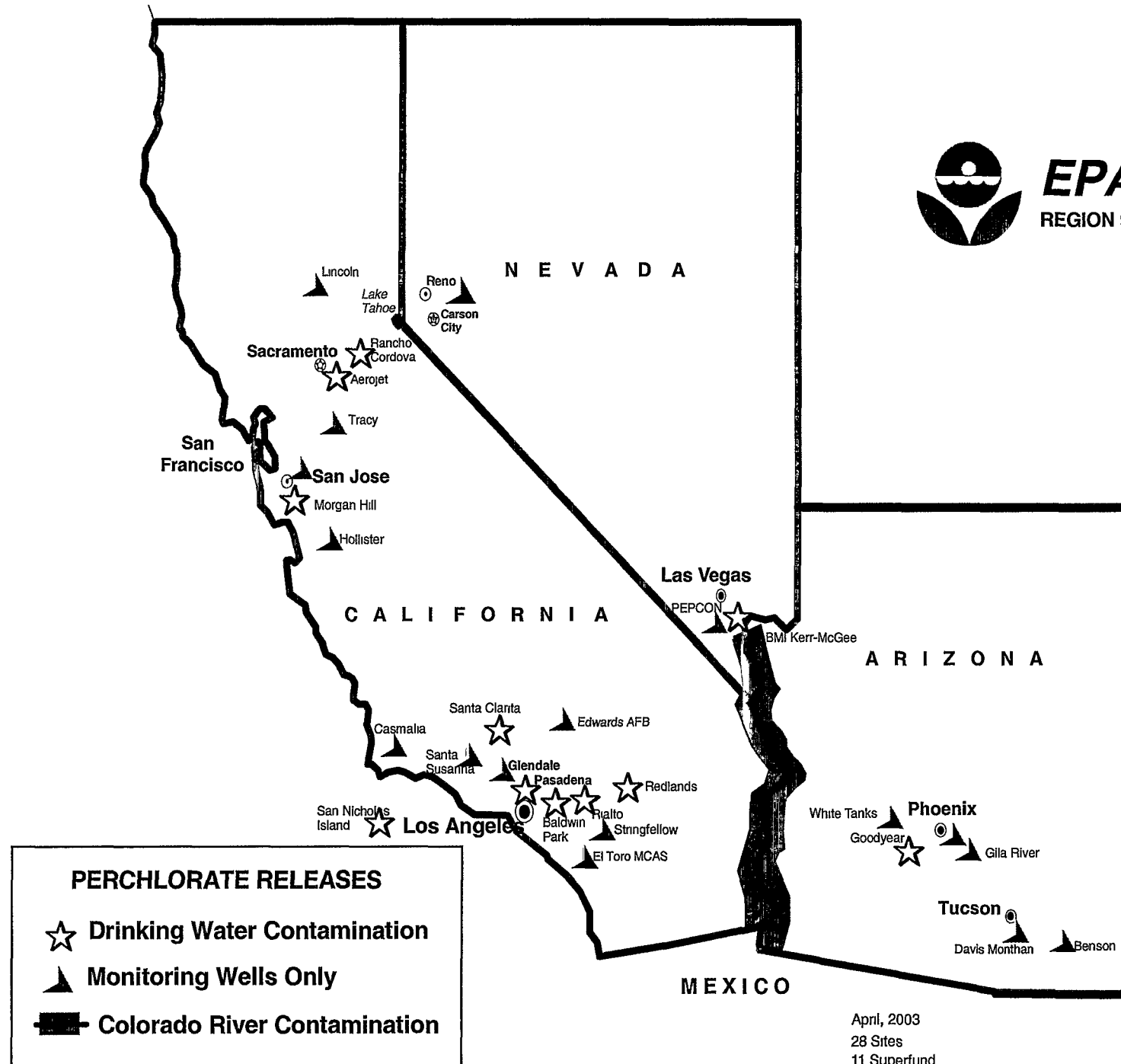
**AL, AZ, AR, CO, GA, IA, KS, MD, MO, MA, MN,
NE, NV, NJ, NM, NY, NC, OR, PA, TX, UT, VA,
WA, WV, also FL, LA, MS, RI since April**

CALIFORNIA

**Over 5800 Water Supply Wells Tested
Detected in 329 sources, 5.6 %**

PERCHLORATE RELEASES – April, 2003





April, 2003
28 Sites
11 Superfund

**In 1997, 900
pounds per day
entered Lake Mead**

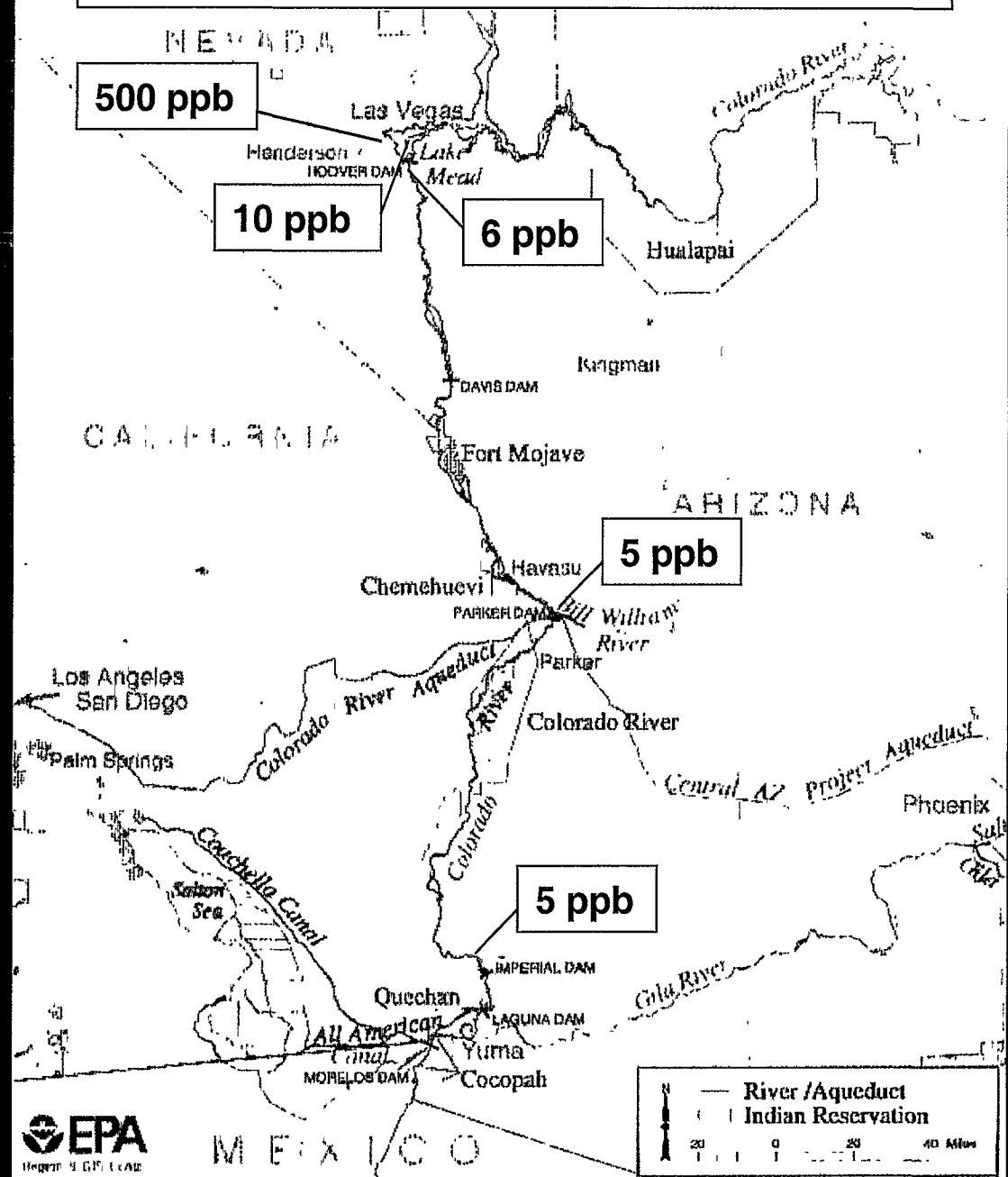
**By 2001, about 500
pounds per day**

**Measurable entire
300 miles to Mexico**

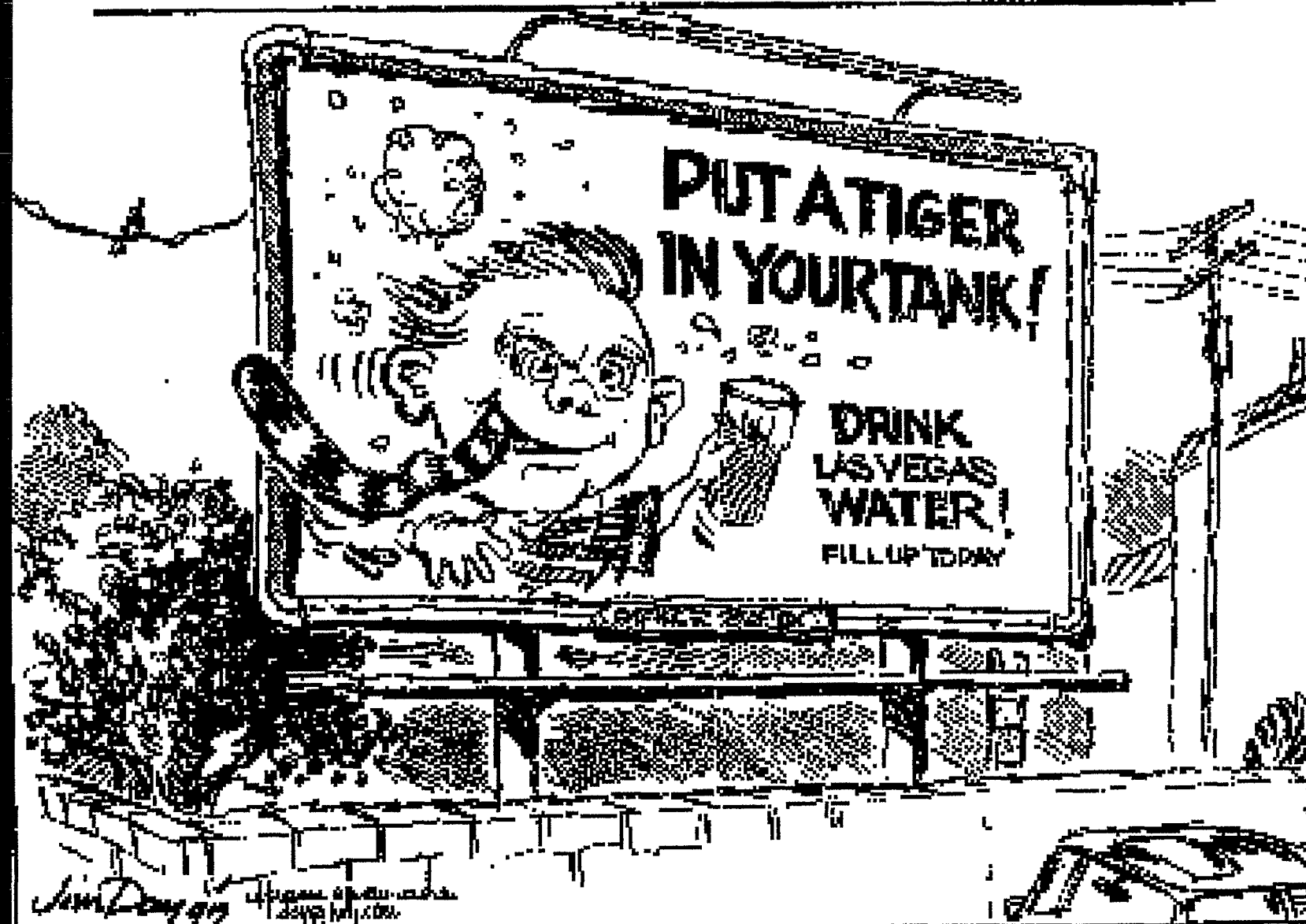
**Used by Las Vegas
Los Angeles, San
Diego, Phoenix and
agriculture**

**Water supply for
over 15 million
people**

Lower Colorado River 2002 Average Perchlorate Concentrations



**SOUTHERN NEVADA WATER AUTHORITY PUTS A POSITIVE SPIN ON REPORTS THAT
A ROCKET FUEL CHEMICAL WAS DETECTED IN LAKE MEAD AND LOCAL WELLS.**



Perchlorate TOXICOLOGY

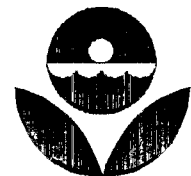
Used as Human Drug Since 1950's

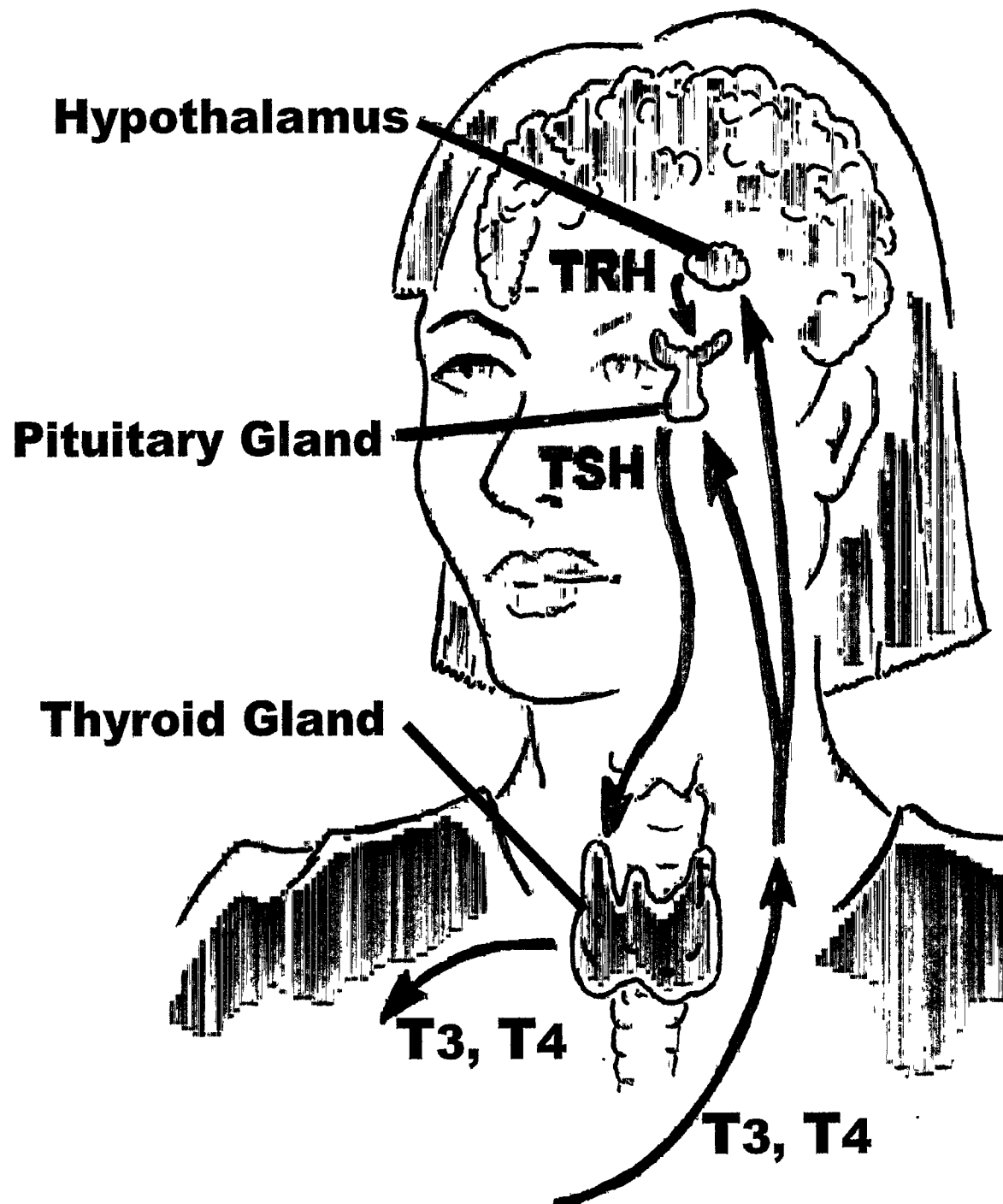
**Blocks Iodide Uptake into Thyroid,
Disrupts Production of Hormones**

**EPA Provisional Reference Dose 1992-95
4 to 18 ppb in Drinking Water**

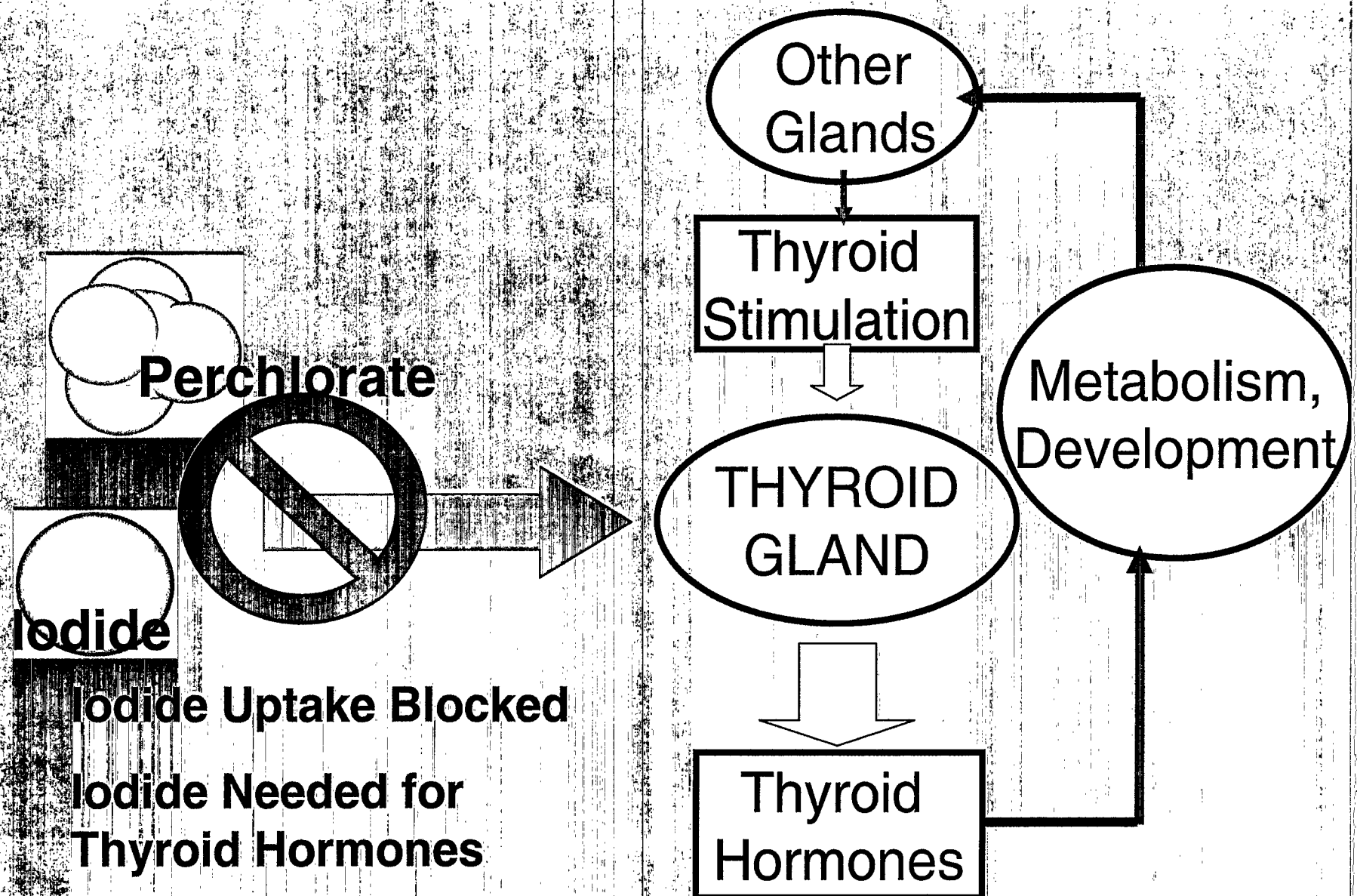
**No Data on Children's Health or Chronic
Effects**

1000x Uncertainty Factors





Perchlorate Mode of Action



Perchlorate TOXICOLOGY



**Studies from 1997 to 2001 Used to
Measure Impact**

**EPA Focused on Sensitive Populations
and Chronic Effects**

**Draft EPA Toxicity Assessment Set RfD at
0.00003 mg/kg-day**

**Drinking Water Equivalent = 1 ppb for
Adults**

Only 300x Uncertainty Factors

Perchlorate TOXICITY

EPA Schedule

January - June 2002 External Peer Review

Expected Final Draft in Spring 2003

2003 National Academy of Sciences Review

**2004 (approx.) Revised Reference Dose on
Integrated Risk Information System (IRIS)**



Perchlorate REGULATORY STATUS



**EPA has Exercised Authority Under
SDWA, RCRA, CERCLA**

**Cleanup Decisions are Site-specific, No Federal
Standard**

**Contaminant Candidate List to Consider
Possible Drinking Water Standard (MCL)**

**EPA's MCL Process Takes Several Years
(2008?)**

Possible EPA Health Advisory (Office of Water)

Perchlorate REGULATORY STATUS



States and Tribes are Developing Standards

California... 4 ppb

New York... 5 ppb and 18 ppb

Texas... 4 ppb, 7 ppb or 10 ppb

Arizona... 14 ppb

Massachusetts... 1 ppb

Maryland... 1 ppb

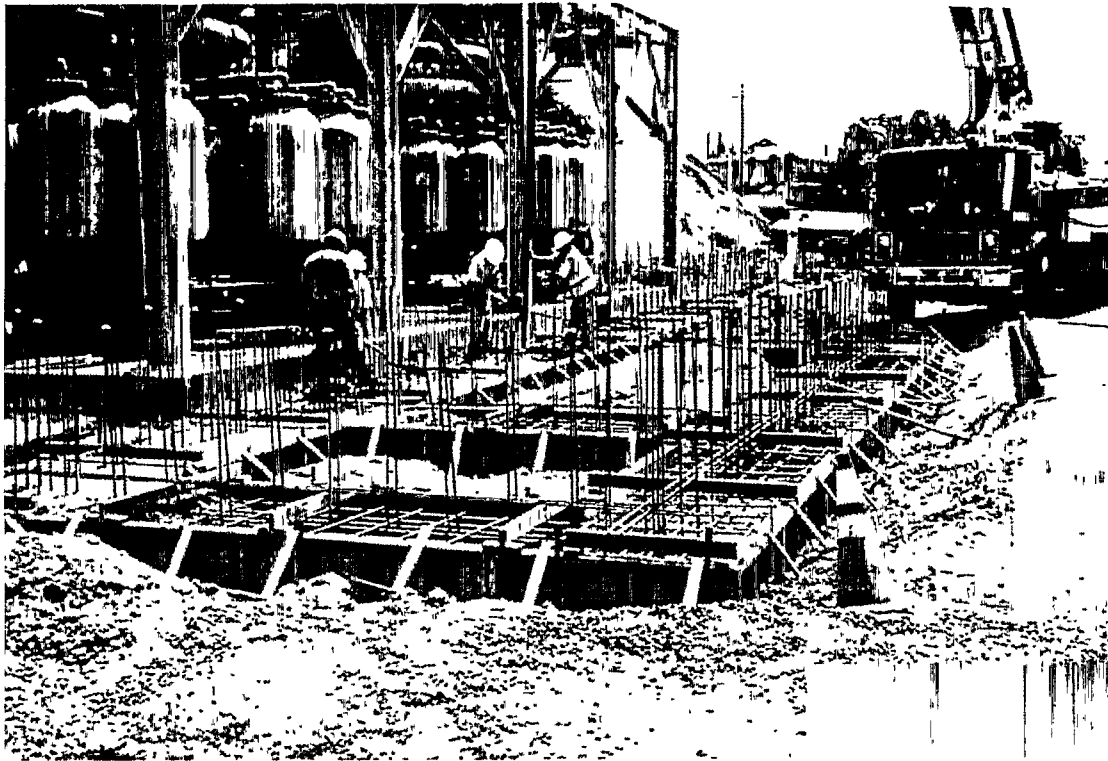
New Mexico... 1 ppb

Nevada... 18 ppb

Perchlorate TREATMENT TECHNOLOGIES

**Treatment Systems are Operating
Full Scale, Commercially Available
Ion Exchange – Regenerate or Dispose
Various Types of Biological Systems
Reverse Osmosis for Small Systems**





**Ion Exchange
San Gabriel
Superfund Site
Baldwin Park, CA**

**Fluidized Bed
Bioreactors at Aerojet
Superfund Site
Rancho Cordova, CA**

